

Proposal # 2001- <u>F 206</u> (Office Use Only)
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PSP Cover Sheet (Attach to the front of each proposal)

Proposal Title: Assessing the Relative Contribution of Nutrient Sources to the San Joaquin River using Molecular Tracers
 Applicant Name: Stroud Water Research Center
 Contact Name: Laurel J. Standley
 Mailing Address: 970 Spencer Road, Avondale, PA 19311
 Telephone: 610-768-7153 x229
 Fax: 610-268-0490
 Email: lstandley@stroudcenter.org

Amount of funding requested \$ _____

Some entities charge different costs dependent on the source of the funds. If it is different for state or federal funds list below.

State cost _____

Federal cost _____

Cost share partners?____ Yes X No

Identify partners and amount contributed by each _____

Indicate the Topic for which you are applying (check only one box).

- | | |
|--|--|
| <input type="checkbox"/> Natural Flow Regimes | <input type="checkbox"/> Beyond the Riparian Corridor |
| <input type="checkbox"/> Nonnative Invasive Species | <input type="checkbox"/> Local Watershed Stewardship |
| <input type="checkbox"/> Channel Dynamics/Sediment Transport | <input type="checkbox"/> Environmental Education |
| <input type="checkbox"/> Flood Management | <input type="checkbox"/> Special Status Species Surveys and Studies |
| <input type="checkbox"/> Shallow Water Tidal/ Marsh Habitat | <input type="checkbox"/> Fishery Monitoring, Assessment and Research |
| <input checked="" type="checkbox"/> contaminants | <input type="checkbox"/> Fish Screens |

What county or counties is the project located in? Fresno, Madera, Mariposa, Merced, Stanislaus, San Joaquin

What CALFED ecozone is the project located in? See attached list and indicate number. Be as specific as possible Zones 11, 17, 13, 14

Indicate the type of applicant (check only one box):

- | | |
|--|--|
| <input type="checkbox"/> State agency | <input type="checkbox"/> Federal agency |
| <input type="checkbox"/> Public/Non-profit joint venture | <input checked="" type="checkbox"/> Non-profit |
| <input type="checkbox"/> Local government/district | <input type="checkbox"/> Tribes |
| <input type="checkbox"/> University | <input type="checkbox"/> Private party |
| <input type="checkbox"/> Other: _____ | |

Indicate the primary species which the proposal addresses (check all that apply): None

- | | |
|--|--|
| <input type="checkbox"/> San Joaquin and East-side Delta tributaries fall-run chinook salmon | <input type="checkbox"/> Spring-run chinook salmon |
| <input type="checkbox"/> Winter-run chinook salmon | <input type="checkbox"/> Fall-run chinook salmon |
| <input type="checkbox"/> Late-fall run chinook salmon | <input type="checkbox"/> Longfin smelt |
| <input type="checkbox"/> Delta smelt | <input type="checkbox"/> Steelhead trout |
| <input type="checkbox"/> Splittail | <input type="checkbox"/> Striped bass |
| <input type="checkbox"/> Green sturgeon | <input type="checkbox"/> All chinook species |
| <input type="checkbox"/> White Sturgeon | <input type="checkbox"/> All anadromous salmonids |
| <input type="checkbox"/> Waterfowl and Shorebirds | <input type="checkbox"/> American shad |
| <input type="checkbox"/> Migratory birds | |
| <input type="checkbox"/> Other listed T/E species: _____ | |

Indicate the type of project (check only one box):

- | | |
|---|---|
| <input checked="" type="checkbox"/> Research/Monitoring | <input type="checkbox"/> Watershed Planning |
| <input type="checkbox"/> Pilot/Demo Project | <input type="checkbox"/> Education |
| <input type="checkbox"/> Full-scale Implementation | |

Is this a next-phase of an ongoing project? Yes _____ No X
Have you received funding from CALFED before? Yes _____ No X

If yes, list project title and CALFED number _____

Have you received funding from CVPIA before? Yes _____ No X

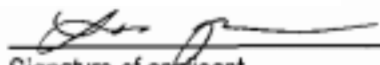
If yes, list CVPIA program providing funding, project title and CVPIA number (if applicable):

By signing below, the applicant declares the following:

- The truthfulness of all representations in their proposal;
- The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and
- The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant to the extent as provided in the Section.

Laurel J. Standley

Printed name of applicant

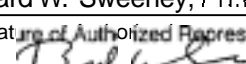

Signature of applicant

APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

1. TYPE OF SUBMISSION		2. DATE SUBMITTED May 13, 2000	Applicant Identifier 051200LJSUNB
Application <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Construction	Preapplication <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction	3. DATE RECEIVED BY STATE	Slate Application Identifier
		4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier

5. APPLICANT INFORMATION	
Legal Name: Stroud Water Research Center, Inc.	Organizational Unit: Stroud Water Research Center
Address (give city, county, State, and zip code): Avondale, Chester County, PA 19311-9514	Name and telephone number of person to be contacted on matters involving this application (give area code): PI: Laurel J. Standley, Ph.D. (610) 268-2153 Admin: John D. Pepe (610) 268-2153
6. EMPLOYER IDENTIFICATION NUMBER (EIN): 52-2081073	7. TYPE OF APPLICANT: (enter appropriate letter in box) <div style="display: flex; justify-content: space-between;"> <div> A. State B. County C. Municipal D. Township E. Interstate F. Intermunicipal G. Special District </div> <div> H. Independent School Dist. I. State Controlled Institution of Higher Learning J. Private University K. Indian Tribe L. Individual M. Profit Organization N. Other (Specify) <u>Non-Profit</u> </div> </div>
8. TYPE OF APPLICATION: <input type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision If Revision, enter appropriate letter(s) in box(es) <input type="checkbox"/> <input type="checkbox"/> A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (specify): _____	
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: <div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> TITLE: _____	9. NAME OF FEDERAL AGENCY U.S. Environmental Protection Agency - ORD - NCERQA
12. AREAS AFFECTED BY PROJECT (Cities, Counties, States, etc.): United States of America	11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Assessing Sources of Nutrients to the San Joaquin River using Molecular Tracers

13. PROPOSED PROJECT		14. CONGRESSIONAL DISTRICTS OF	
Start Date 01/01/01	Ending Date 12/31/03	a. Applicant 16th	b. Project Multiple
15. ESTIMATED FUNDING:		16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?	
a. Federal	\$ 874,642 ⁰⁰	a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON: DATE _____	
b. Applicant	\$ ⁰⁰	b. NO. <input type="checkbox"/> PROGRAM IS NOT COVERED BY E. O. 12372	
c. Slate	\$ ⁰⁰	<input checked="" type="checkbox"/> OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW	
d. Local	\$ ^m	17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?	
e. Other	\$ ^m	<input type="checkbox"/> Yes If "Yes," attach an explanation. <input checked="" type="checkbox"/> No	
f. Program Income	\$ ⁰⁰		
g. TOTAL	\$ 874,642 ⁰⁰		
18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.			
a. Type Name of Authorized Representative Bernard W. Sweeney, Ph.D.		b. Title Director	c. Telephone Number (610) 268-2153
d. Signature of Authorized Representative 		e. Date Signed 12 May 00	

☒ No ☐ Yes (If yes, complete Form CSREES-662)

22. WILL THIS PROJECT BE SENT OR HAS IT BEEN SENT TO OTHER FUNDING AGENCIES, INCLUDING OTHER USDA AGENCIES?

☒ No ☐ Yes (If yes, list Agency acronym(s) & program(s))

* signing and submitting this proposal, the applicant is providing the required certifications set forth in 7 CFR Part 3017, as amended, regarding Debarment and Suspension and Drug-Free Workplace; and 7 CFR Part 3018 regarding Lobbying. Submission of the individual forms is not required. (Please read the instructions and instructions included in this kit before signing this form.)

In addition, the applicant certifies that the information contained herein is true and complete to the best of knowledge and accepts as to any award, the obligation to comply with the terms and conditions of Cooperative State Research, Education, and Extension Service in effect at the time of the award.

SIGNATURE OF PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) (All PI's/PD's listed in block 15 must sign if they are to be included in award document.)

DATE

May 12, 2000

SIGNATURE OF AUTHORIZED ORGANIZATIONAL REPRESENTATIVE (Same as item 3)

TITLE

DATE

Director

May 12, 2000

Form CSREES-661 (6/95)

B. Executive Summary

Title: Assessing the Relative Contribution of Nutrient Sources to the San Joaquin River using Molecular Tracers
Amount requested: \$874,640
Applicant: Laurel J. Standley, Ph.D.; Stroud Water Research Center, 970 Spencer Rd, Avondale, PA; Phone: 610-268-2153 (ext. 229), FAX: 610-268-0490; email: ljstandley@stroudcenter.org
Collaborator: J. Denis Newbold, Ph.D.

Molecular tracers will be utilized in this project to apportion sources of nutrients that contribute to depletion of dissolved oxygen in the lower San Joaquin River. Because certain contaminants can be produced by multiple sources (e.g. nutrients are present in waste water treatment plant effluents, animal manure, and atmospheric deposition), the molecular tracers allow a more definitive identification of sources that contribute to degradation of water quality.

We propose three subtasks for this project: (a) sources of nutrients will be characterized with respect to nutrient and molecular tracer content; (b) river water will be collected during wet (March/April) and dry (August/September) seasons for three years at upstream and downstream sites from 7 east-of-valley tributaries and 2 west-of-valley tributaries, as well as three sites on the main stem of the San Joaquin River upstream of Stockton; and (c) experiments will be conducted to determine relative transformation rates of nutrient and molecular tracers in the water column. These three tasks will result in a three year baseline of data that can be interpreted in the context of source data (relative quantities of tracers and nutrients) and transformation data (water column transformation rates of tracers and nutrients) to provide information on the relative contributions of various sources to the nutrient budget in the San Joaquin River.

Our hypotheses are that: (1) nutrients are produced by contaminant sources which also produce unique assemblages of components that can be utilized as molecular tracers for source apportioning; and (2) use of multiple tracers for each nutrient increases the strength of correlations with nutrients from different sources. Use of molecular tracers that are not conservative for nutrients will result in uncertainty in the analysis, as will loss of particulate nutrients due to settling and the release/uptake of nutrients from/into refractory pools.

Using a definitive approach, such as source apportionment using molecular tracers, will enhance the accuracy of decision-making in regard to implementation of restoration activities and best management practices. The molecular tracer method can provide guidance both for determining which nutrient sources to target for reduction and which implementation projects are effective at reducing nutrients in watersheds with multiple projects and sources.

C. Project Description

1. Statement of the Problem

a. **Problem.** Dissolved oxygen concentrations in the lower San Joaquin River reach critical levels under low flow, summer conditions (Peggy Lehman, personal communication; synopsis of proposal #D119 funded in 1999). Nutrient sources located in the San Joaquin watershed can contribute to the problem. Thus, accurate identification and apportionment of nutrient sources is essential to optimize efforts at reducing loadings of nutrients using available resources.

The objective of this proposed study is to develop a method for using molecular tracers of nutrient sources to identify and apportion the major contributors of nutrient loadings in the San Joaquin River. This method will be a definitive tool useful for developing the framework to meet Total Maximum Daily Loadings (TMDLs) and for monitoring improvements in water quality after implementation of remediation and best management practices. Work has been conducted by U.S.G.S. researchers on sources of nitrogen and phosphorus in the watersheds draining into the San Joaquin (e.g. Kratzer and Shelton 1998, Dubrovsky et al. 1998). However, to our knowledge, a basin-wide, quantitative assessment of the utility of molecular tracers in source apportionment has not been conducted.

b. **Conceptual model.** Contaminant sources produce a wide array of components in addition to the target contaminants that include nutrients. There is a wealth of information present in these effluents that can be exploited to allow, first, a separation of sources by the characteristic fingerprint of effluent components and, second, an apportionment in receiving waters of the contribution of nutrients by each unique source. In general, the difficulty is in doing that separation quantitatively in a complex environment and most studies to date using molecular tracers have been qualitative identifications of sources. Selected studies have increased the utility of the method as a quantitative tool. For example, Leeming et al. (1997) estimated relative proportions of human and herbivore contributions to fecal matter in inland waters of Australia. And Samadpour (1999) has succeeded in using the genetic material of *E. coli* as conservative tracers for clarifying sources of pathogens to receiving waters.

There are several factors that need to be addressed in developing a molecular tracer method. First, the more closely the tracer tracks the fate and transport behavior of a target contaminant, the better. The most conservative tracer for a contaminant is a distinguishing characteristic inherent in the molecule itself. An example of that form of tracer is use of the isotopic composition of nitrogen to track nitrate sources, such as inorganic fertilizer and manure which differ in the relative amount of the ^{15}N isotope. The second aspect that strengthens the use of molecular tracers is the extent to which they are unique to a particular source. By targeting several tracers for each source, the strength of the source separation and contaminant tracking is increased. For example, in the example given above, nitrate from fertilizer and manure can be separated using the isotopic composition of nitrogen but manure cannot be separated from human sewage using this tracer. To

strengthen the separation between the two latter contaminant sources, use of additional tracers, such as caffeine and laundry detergent fragrances, is required. These tracers may not be as conservative for nitrate; however, they are unique to human sewage sources and thus allow a separation from manure as a source of nutrients.

There are uncertainties that may impact the accuracy of source apportionment in this study, including in-stream deposition and resuspension of particulate nutrients (e.g. retention of particulate phosphorus by riverine sediments) and release and incorporation of nutrients from or into refractory components. However, these issues are beyond the scope of this proposed work. Ultimately, without the more definitive identification of nutrient sources provided by the use of molecular tracers, misidentification of sources can result in use of limited resources in a manner that does not reduce nutrient loadings.

c. Hypotheses being tested.

I. Nutrients, which contribute to critically low concentrations of dissolved oxygen in the lower San Joaquin River, are produced by contaminant sources which also produce unique assemblages of components that can be utilized as molecular tracers in a source apportionment model.

II. By utilizing multiple tracers for each nutrient source to compensate for weaknesses in individual tracers, the strength of correlations will be increased such that a quantitative apportionment of sources can be obtained.

In order to test these hypotheses, the following data will be acquired: (a) three years of data on in-stream concentrations of nutrients and concurrent molecular tracers will be collected for wet and dry seasons to generate a baseline representing average climate and nutrient generating activities on the watershed; (b) accurate characterization of the relative concentrations of nutrients and associated molecular tracers in source effluents will be conducted to provide a quantitative link between nutrients and tracers in source apportionment; and (c) relative transformation rates of nutrients and associated tracers will be determined for water column processes to provide information on the extent to which selected tracers conservatively track the nutrient of concern.

The San Joaquin River drains numerous subwatersheds impacted by a large number and wide range of anthropogenic and natural activities, all of which can contribute nutrients linked to the decline in dissolved oxygen in the lower river during the summer. To remediate all potential upstream nutrient sources would be prohibitively expensive. *Also*, targeting sources based on their "potential" for contributing nutrients rather than their actual contribution to the river can result in an inaccurate identification of relative contributions of nutrient sources, which would result both in a waste of resources and a delay in dealing with the nutrient problem. The molecular tracer method is a definitive technique for identifying the sources that are actually contributing to the nutrient loadings in the San Joaquin River since the tracers are transported into the river along with the nutrients.

d. Adaptive management. Following development of a baseline molecular tracer model for nutrient sources in the San Joaquin River, the impact of restoration, remediation, and implementation of best management practices can be assessed and incorporated into ongoing decisions regarding selection of management tools that target improvements in nutrient loadings. For example, if improvements are made simultaneously to two sources (e.g. a waste water treatment plant and riparian buffers along a manure-amended field), the tracer method can be utilized to elucidate which alteration resulted in a greater impact on nutrient loadings.

Without the guidance provided by a definitive technique like the molecular tracers, there is a higher probability that implementation efforts will be targeted toward sources that are not the primary sources of nutrients or that in order to successfully reduce nutrient loadings, implementation projects must be placed broadly at great expense. The molecular tracer method can provide the guidance both for determining which nutrient sources to target and which implementation projects are effective at reducing nutrients in watersheds with multiple projects and sources.

e. Educational objectives. The project does not have a direct educational objective; however, it is our goal to produce a tool that allows decisions to be made based on scientific documentation of source identification. We expect that our primary audience will be regulatory agencies.

2. Proposed Scope of Work.

a. Location and/or geographic boundaries of the project. Sites were selected in Ecological Management Zones numbering 11-14 (Attachment A) on six major eastern and two western tributaries and the upper San Joaquin to represent upstream (above human watershed activities) and downstream (just prior to confluence with San Joaquin, main stem) water quality. Three sites are located along the main stem, with the northernmost located just upstream of Stockton. Coordinates of sites are listed below in Table I.

Table I. Study sites (estimated latitude/longitude)

Tributary/River	Upstream	Downstream
<i>East</i>		
Stanislaus R.	37°48'/120°42'	37°40'/121°15'
Tuolumne R.	37°38'/120°30'	37°35'/120°08'
Merced R.	37°30'/120°20'	37°20'/120°55'
Chowchilla R.	37°15'/120°05'	37°05'/120°32'
Fresno R.	37°05'/119°53'	36°57'/120°30'
upper San Joaquin R.	36°57'1119°40'	36°48'/120°20'
Kings R.	36°45'/119°25'	36°35'/119°48'
<i>West</i>		
Del Puerto Cr.	37°28'/121°20'	37°32'/121°10'
Orestimba Cr.	37°15'/121°15'	37°25'/121°00'



Figure 1. Samplingsites (see text for coordinates)

Main Stem

Stockton	37°50'/121°15'
Near Newman	37°20'/121°00'
Below confluence Fresno Sl.	36°35'/120°25'

b. Approach. Molecular tracers will be utilized in this project to apportion the contribution of key sources to nutrient budgets in the San Joaquin River. Briefly, we propose three project subtasks: (a) sources (listed below) will be characterized with respect to their nutrient and molecular tracer content; (b) river water will be collected during wet (March/April) and dry (August/September) seasons for three years in each of the major tributary rivers above anthropogenic land-uses of concern (background) and above the confluence with the main stem of the San Joaquin (e.g. at sites integrative of that tributary's watershed) and at three additional sites along the main stem of the San Joaquin River, with the final site to be located just above the zone of dissolved oxygen depletion; and (c) transformation experiments will be conducted during late winter/early spring and summer to determine relative residence times of nutrients and molecular tracers in the water column. These three tasks will result in a three year baseline of data that can be interpreted in the context of source data (relative quantities of tracers and nutrients) and transformation data (water column transformation rates of tracers and nutrients) to provide information on the relative contributions of various sources to the nutrient budget in the San Joaquin River.

Correlation of molecular tracers with nutrients is a critical aspect of source apportionment. The tracers were selected to match the chemistry of their targets as closely as possible, with additional tracers selected to strengthen the separation between different sources. For example, the key tracer selected for nitrogen, $\delta^{15}\text{N}$ composition of nitrate, is most conservative for that nutrient. However, because it is not possible to separate more than two major sources or end-members using that tracer and human and agricultural animal sources have the same isotopic composition, we have added additional tracers to target nitrogen sources. Dissolved organic carbon (DOC) will be tracked using tracers oxidized directly from the macromolecular organic matter (lignin-decomposition products), as well as molecular tracers that are also produced by DOC sources. Because phosphorus does not have stable isotopes that can be utilized as tracers, we will track that nutrient indirectly using molecular tracers concurrently produced by P-sources. Background levels and atmospheric deposition of nutrients and tracers will be assessed at sites upstream of anthropogenic activities in the watersheds.

Specific tracers to be analyzed are listed below in Table II. Sources of nitrogen, phosphorus, and dissolved organic matter (DOM) that we are targeting include agricultural runoff (inorganic and manure soil amendments), runoff from animal feedlot operations, waste water treatment plant effluent (WWTP), runoff from soils amended with municipal sewage sludge, urban/suburban runoff, and background concentrations from natural sources and atmospheric deposition. Samples will also be analyzed for nutrients (nitrate, total phosphorus, and dissolved organic carbon [DOC]).

Table 11. Molecular Tracers Associated with Nutrient Sources

Source	Nutrients	Tracers
Agricultural runoff	DOM, N, P	$\delta^{15}\text{N-NO}_3^-$ fecal steroids veterinary medicines lignin decomposition products
WWTP, sludge	DOM, N, P	$\delta^{15}\text{N-NO}_3^-$ caffeine fragrances fecal steroids lignin decomposition products
Urban runoff	DOM	petroleum hydrocarbons unresolved complex mixture (UCM) alkyl- & nonalkyl-PAHs
Nature/Atmos. Dep	DOM, N, P	$\delta^{15}\text{N-NO}_3^-$ fecal steroids lignin decomposition products

Specific tracer compounds include: (a) fecal steroids cholesterol, coprostanol, epicoprostanol, **5 α -cholestan-3 β -ol**, **24-ethylcoprostanol**, 24-ethylcholesterol, **5 β -cholestan-3-one**, 5 α -cholestan-3-one.; (b) caffeine and fragrances galaxolide (1,3,4,6,7,8-hexahydro-4,6,6,7,8,8,-hexamethyl-cyclopenta-g-2-benzopyran) and tonalid (6-acetyl-1,1,2,4,4,7-hexamethyltetraline); (c) petroleum-derived n-alkanes (derived by subtracting plant waxes after the method of Simoneit et al. 1993); (d) the unresolved complex mixture (UCM) which is comprised of combustion- and petroleum-derived branched and cyclic compounds (Valls et al. 1989); and (e) lignin decomposition products vanillic acid, vanillin, acetovanillone, syringic acid, syringaldehyde, acetosyringone (Hedges and Mann 1979). The distribution of components in these compound classes vary according to plant and animal origin and thus ratios also prove useful as tracers (e.g. Hedges and Mann 1979, Leeming et al. 1997, Standley et al. 2000).

Samples will be kept cool (4°C) and dark, filtered within 24 h through pre-cleaned (ashed at 450°C) Whatman GF/F filters, and extracted within 5 d using precleaned C-18 Empore Disks (cleaning of disks and elution of compounds conducted using CH_2Cl_2 and CH_3OH). Filters will be stored frozen until extraction by sonication in CH_2Cl_2 and CH_3OH . Sample extracts will be concentrated gently using N_2 -blowdown evaporation to avoid loss of the more volatile compounds. N_2 -sparged extracts will be silylated with **N-methyl-N-(trimethylsilyl)-trifluoroacetamide** (MSTFA, Pierce) to derivatize alcohols and then analyzed using gas chromatography/mass spectrometry (30 m DB1701 column, electron impact mode, Agilent 5973N). Methods are discussed in further detail in Standley et al. (2000). Organic tracers will be quantified in one run using electron impact detection and

selected ion monitoring to improve sensitivity. Samples for analysis of nutrients (except DOC), isotopic analysis, and veterinary medicines by subcontractors will be shipped to their facilities directly from the field. Samples for DOC analysis will be preserved using sodium azide after filtration and then returned with our samples for analysis.

For quality control, a laboratory blank will be included with each batch of samples (not more than 10 per batch) and surrogate standards will be added to each sample to monitor recovery. Field duplicates, laboratory duplicates, and matrix spikes will also be analyzed at a rate of 1/20 samples. The mass spectrometer will be tuned and calibrated each 12h work period. Chain-of-custody forms will be completed for each sample.

Data collection for organic tracers will be conducted using Chem Station software (Windows NT). Results for molecular tracers will be normalized according to the target nutrient (e.g. tracer/N or P or DOC). Results will be modeled using an end-member mixing analysis. Tracers that are most conservative for nutrients (determined in transformation studies) and unique to the sources will be selected as primary tracers, with additional tracers selected to strengthen the separation of multiple sources of nutrients in the San Joaquin River.

c. Monitoring and assessment plans. Not applicable because this project is research only.

d. Data handling and storage. After validation and verification, raw data will be stored in SAS data sets. Molecular tracer data obtained using mass spectrometry will be stored as Chem Station (Windows-NTbased) data sets. Transfer of Chem Station data to SAS data sets will be electronic. All final analyses, whether primary or derived, will be based on these verified data sets. Data will be reported in the Annual and Final Reports as raw data, in summary tables, and as graphics. SAS data sets can be reported and formatted for transfer to other computer systems and are backed up twice per week and stored in an archival environment. Chem Station data is backed up weekly and stored in an archival environment.

e. Expected products/outcomes. Products will include quarterly reports, annual reports, and a final report due at the end of the project. Presentations on results will be made by the P.I. and the post-doctoral fellow at national scientific meetings such as the American Chemical Society and the Society for Environmental Toxicology and Chemistry. Data and results will also be placed on the Stroud Center's web page at the end of the project.

f. Work schedule.

Subtask	Year 1		Year 2		Year 3	
	Mar	Aug	Mar	Aug	Mar	Aug
<i>Field work and analyses:</i>						
Source sampling	X	X				
In-stream sampling	X	X	X	X	X	X
Transformation experiments			X	X		
<i>Milestones:</i>						
Construction of model (qualitative only)			X			
Determination of primary tracers					X	
Quantitative method developed						X

Samples will be collected and experiments conducted during the wet season (March/April) and dry season (August/September). Analyses of samples will be conducted during periods between sampling and transformation experiments. Modeling will begin upon completion of the first year's analyses and will be updated with each year's additional information. Until analysis of transformation experimental results and the three year baseline are complete, model results will be qualitative only.

With respect to the potential for partial funding (e.g. deletion of one or more subtasks), all three subtasks proposed here are required for development of a quantitative source assessment method using molecular tracers. Because of inter-year variability due to changes in climate and nutrient generating activities on the watershed, three years of monitoring nutrients and associated molecular tracers will be necessary to provide a baseline that is both an accurate representation of relative contributions of contaminant sources to the San Joaquin and a reference point to test the effectiveness of implementation of restoration projects and best management practices. Accurate characterization of the relative concentrations of nutrients and associated molecular tracers in source effluents is necessary to provide a quantitative link between nutrients and tracers in source apportionment. Finally, the riverine behavior of nutrients and associated tracers is not conservative; thus, assessment of relative transformation rates will allow selection of the tracers that are most conservative for the nutrient of concern and facilitate quantification of the limitations of the method.

g. Feasibility.

Several precautions have been taken to allow for exigencies. For example, in-stream sampling will occur over a period of three years to counter skewing of results due to an unusual year of weather (e.g. drought). The sampling team will consist of three people to allow two tasks to be conducted simultaneously while we are in the field. For example, two people will conduct in-stream sampling while one collects source materials. With a twice annual sampling schedule, there will be ample time to process and analyze samples. Water samples will be extracted while we are in California such that should a sample be lost, it can be readily replaced. Finally, when

surface runoff cannot be collected due to lack of storms, we will extract surface materials using a cold water extraction. No permits are required for our experiments.

D. Applicability to CALFED ERP Goals and Implementation Plan and CVPIA Priorities

1. ERP Goals and CVPIA Priorities.

The work proposed here targets the problem of dissolved oxygen depletion in the lower San Joaquin River during low flow, summer conditions. We propose to develop a molecular tracer method for quantifying contributions of nutrient sources to the San Joaquin River. Using a definitive approach such as this will greatly enhance the accuracy of decision-making in regard to implementation of restoration activities and best management practices.

2. Relationship to Other Ecosystem Restoration Projects.

Work proposed here would complement research underway by the Department of Water Resources (1999 Grant #D119) on causes of dissolved oxygen depletion occurring in the lower San Joaquin River. Because nutrients have been linked both indirectly and directly to dissolved oxygen depletion in water bodies, an accurate identification of nutrient sources allows resources funding remediation and implementation of best management practices to be focused in a manner that reduction of nutrient loadings is optimized.

3. Requests for Next-Phase Funding. Not applicable because this is a first request.

4. Previous Recipients of CALFED or CVPIA funding. Not applicable because this is a first request.

5. System-Wide Ecosystem Benefits.

This project will complement ongoing research on loss of dissolved oxygen in the lower San Joaquin River.

E. Qualifications

Laurel J. Standley is a Research Scientist at the Stroud Water Research Center where she studies fate and transport of natural and anthropogenic organic compounds in streams and rivers. She received a B.S. in Chemistry from California Polytechnic State University, San Luis Obispo, in 1979 and a Ph.D. in marine chemistry from Oregon State University, Corvallis, in 1987. Laurel worked as an analytical chemist in industry between 1980 and 1982 before returning to school to get her Ph.D., where she did research with Professor Bernd R. T. Simoneit on identifying sources of smoke in the atmosphere using combustion byproducts such as thermally altered natural products. From 1987 through 1989, Laurel studied environmental mass spectrometry as a post-doctoral candidate under Professor Ronald A. Hites at Indiana University, Bloomington. Laurel joined the Stroud Center in 1989 and has been conducting research in molecular tracers of natural and anthropogenic organic matter, transformation of organics in streams, and factors that affect the bioavailability of xenobiotics to aquatic biota. Her manuscript on related research funded by the American Water Works Association Research Foundation was just accepted by Environmental Science and Technology (Standley et al. 2000). Additional funded projects that are related to the use of molecular tracers to identify the influence of contaminants in watersheds include a recently funded EPA Star grant ("Molecular Tracers of Contaminant Sources to Surface Water Drinking Supplies", L. J. Standley, P.I.) and a grant funded by the State of New York ("Water Quality Monitoring in the Source Water Areas for New York City: An Integrated Watershed Approach", B. W. Sweeney, P.I.). Dr. Newbold, the co-P.I. on this proposal, is also participating in these studies.

J. Denis Newbold is a Research Scientist at the Stroud Water Research Center where he studies nutrient cycling, organic particle transport, and riparian zone influences in stream ecosystems. He received a B.S. in engineering from Swarthmore College in 1971, an M. S. in hydrology from Cornell University in 1973, and a Ph.D. in aquatic ecology from the University of California, Berkeley, in 1977. From 1977 through 1983, Denis worked in the Environmental Sciences Division at Oak Ridge National Laboratory, where he was involved in both theoretical development and experimental analysis of the nutrient spiraling concept. Since joining the Stroud Center (then part of the Academy of natural Sciences of Philadelphia) in 1983, his work has included modeling temperature influences on insect life histories, experimental studies of the spiraling of dissolved and particulate organic carbon, and investigations of the role of riparian forest buffers in mitigating nonpoint source pollution.

Dr. Laurel J. Standley will serve as project coordinator and is responsible for molecular tracer analysis, Dr. J. Denis Newbold will serve as an advisor to modeling efforts, a post-doctoral fellow will be hired to assist with coordination of the project and modeling of nutrients and tracers, and a chemistry technician will be responsible for conducting analytical work.

F. Cost

1. Budget. Annual and summary budgets follow.

Budget Justification, Year 1

A. Total Salaries and Wages. Dr. Laurel J. Standley, an organic chemist studying the transport, fate, and effects of organics in aquatic environments, will be responsible for project organization and collection and chemical analysis of samples, as well as interpretation of results. Twenty-five percent of Dr. Standley's time (salary \$67,061) will be dedicated to this project. Dr. J. Denis Newbold, an ecosystem modeler, will advise on modeling efforts and interpretation of results. Five percent of Dr. Newbold's time (salary \$72,691) will be dedicated to this project. 100% of the time of a post-doctoral fellow (salary \$32,000) and a chemistry technician (salary \$26,837) will also be dedicated to this project.

B. Fringe Benefits. The fringe benefit rate is 25.0% of salaries and wages.

D. Nonexpendable Equipment. Reverse-osmosis apparatus to concentrate dissolved organic carbon (\$15,000) and a freeze-drier (\$20,000) will be purchased to allow isolation and concentration of dissolved organic matter.

E. Materials and Supplies. Laboratory supplies and expendables include solvents, standards, glassware, glass fiber filters, Empore disks, and miscellaneous reagents. Additionally, instrument costs (\$42 per sample) will be charged to cover equipment repair and maintenance. A pump (\$950) will be purchased to allow extraction of water samples in the field using solid-phase extraction techniques to maintain compliance with holding time restrictions.

F. Travel - Domestic. Expenses include travel for three people taking two 10 d trips (wet and dry season) to the study region to collect samples and conduct experiments. In year 1 the costs per trip will include: airfare (est. \$700 per person), hotel (\$80 per room), per diem (\$42 per d), car rental (est. \$800), boat rental (est. \$200).

I. Outside Services/Subcontracts. Costs for DOC analyses (Kaplan Laboratory, Stroud Water Research Center, Avondale, PA) are included at a cost of \$30 per sample (94 samples). LC/MS analysis of samples for veterinary medicines are included (E. Michael Thurman, U.S.G.S., Lawrence, KS) at a cost of \$350 per sample (138 samples). Nitrate and total phosphorus (Lancaster Laboratories, Lancaster, PA) will be analyzed at a cost of \$27 and \$25 per sample (94 samples), respectively. Isotopic composition of nitrate ($\delta^{15}\text{NO}_3$, Coastal Sciences Laboratory, Austin, TX) will be analyzed at a cost of \$150 per sample (94 samples).

K. Indirect Costs (F&A). The cognizant agency for the Stroud Water Research Center is the National Science Foundation (NSF). The 54% F&A rate is applicable to a Modified Total Direct Costs (MTDC) base. The MTDC base excludes: (a) capital expenditures and (b) individual outside services. Fringe benefits associated with direct salaries and wages are treated as direct costs and included in the F&A rate application base.

Year 2 and 3 costs are escalated 4% annually.

2. Cost Sharing. There is no cost sharing proposed.

PROPOSAL BUDGET SUMMARY

CALFED BAY-DELTA PROGRAM

Proposed Project Period January 1, 2001 to December 31, 2003

Principal Investigator

Laurel J. Standley, Ph.D.

Organization

Stroud Water Research Center

370 Spencer Road, Avondale, PA 19311-9514

DIRECT COSTS		YEAR I					
Labor (list investigators by name, technical and support personnel by category)		ANNUAL	% EFFORT				
1) Laurel J. Standley, Ph.D. Principal Investigator		\$ 67,016	25.0	\$ 16,754	\$ 17,425	\$ 18,122	\$ 52,301
2) J. Denis Newbold, Ph.D. Co-Investigator		72,691	5.0	3,636	3,780	3,931	11,347
3) Karen D. Jansson, Research Technician		26,832	100.0	26,832	27,914	21,778	76,524
4) TBN, Post-doctoral		31,990	100.0	31,990	33,280	34,611	99,881
A. Total Labor Costs				79,212	82,399	78,442	240,053
B. Fringe Benefits (25.0%)				19,803	20,600	19,611	60,014
Non-Expendable Equipment							
C. Total Non-Expendable Equipment				35,000			35,000
D. Supplies				29,250	29,020	13,220	71,490
E. Equipment Rental							
F. Outside Services				70,108	85,717	38,786	194,611
G. Computer Services							-
H. Consultant Services (other than subcontracts)							
I. Travel				13,520	17,061	13,591	44,172
J. Publication Costs							-
Office Support (only when directly relevant to performance of the proposed project)							
Materials and Supplies							-
Telephone							-
Postage							-
Copying and Printing							-
K. Total Office Support							-
L. Other							
				1,000	1,040	1,082	3,122
M. TOTAL DIRECT COSTS (A through L)				247,893	235,837	164,732	648,462
N. INDIRECT COSTS/OVERHEAD (specify)							
54.0% MTDC (Line M - Line C - Line F)				77,104	81,065	68,011	226,180
O. SUBCONTRACTS (attach separate budgets)							
P. TOTAL COSTS (M + N + O)				324,997	316,902	232,743	874,642

CALFED BAY-DELTA PROGRAM

Assessing Sources of Nutrients to the San Joaquin River Using Molecular Tracers

Laurel J. Standley, Ph.D. - Stroud Water Research Center

	Direct Labor	Included in Base for Overhead (F&A) Calculation						F&A Exempt		Total Cost
		Salaries	Fringe Benefits 25.00%	Travel	Supplies	Other	Overhead (F&A) 54.0% MTDC	Outside Services	Equipment	
Year I	4,106	\$ 79,212	\$19,803	\$13,520	\$29,250	\$ 1,000	\$ 77,104	\$ 70,108	\$35,000	\$324,997
Year II	4,106	82,399	20,600	17,061	29,020	1,040	81,065	85,717	-	316,902
Year III	3,660	78,442	19,611	13,591	13,220	1,082	68,011	38,786	-	232,743
Total	11,872	\$240,053	\$60,014	\$44,172	\$71,490	\$ 3,122	\$226,180	\$194,611	\$35,000	\$874,642

G. Local Involvement

Upon receiving authorization to proceed with the project, we will coordinate with local U.S.G.S. scientists, agricultural extension agents, and municipalities. As we interpret data, we will share our results with these groups such that they can be implemented and interpreted in context with existing data bases.

H. Compliance with Standard Terms and Conditions

We have read and agree to comply with the Standard Terms and Conditions.

I. Literature Cited

- Dubrovsky, N. M., Kratzer, C. R., Brown, L. R., Gronberg, J. M., Burow, K. R. 1998. Water Quality in the San Joaquin - Tulare Basins, California, 1994-1995. U.S.G.S. Circular 1159.
- Hedges, J. I., Mann, D. C. 1979. The characterization of plant tissues by their lignin oxidation products. *Geochim. Cosmochim. Acta.* 43:1809-1818.
- Kratzer, C. R., Biagtan, R. N. 1997. Determination of Traveltimes in the Lower San Joaquin River Basin, California, from Dye-Tracer Studies during 1994-1995. U.S.G.S. Report 97-4018, National Water Quality Assessment Program.
- Kratzer, C. R., Shelton, J. L. 1998. Water Quality Assessment of the San Joaquin - Tulare Basins, California: Analysis of Available Data on Nutrients and Suspended Sediment in Surface Water: 1972-1990. U.S.G.S. Professional Paper 1587.
- Leeming, R. Latham, V., Rayner, M., Nichols, P. 1997. Detecting and distinguishing sources of sewage pollution in Australian inland and coastal waters and sediments. In: Molecular Markers in Environmental Geochemistry, ACS Symposium Series 671, R. P. Eganhouse, Ed., pp. 306-319.
- Samadpour, M. 1999. Presentation at Workshop on Animal Feeding Operations: Effects on Hydrologic Resources and the Environment, U.S.G.S., Fort Collins, CO, August 30 - September 1.
- Simoneit, B. R. T. 1984. Organic matter of the troposphere-111. Characterization and sources of petroleum and pyrogenic residues in aerosols over the western United States *Atmos. Environ.* 18:51-67.
- Simoneit, B. R. T., Rogge, W. F., Mazurek, M. A., Standley, L. J., Hildemann, L. M., Cass, G. R. 1993. Lignin pyrolysis products, lignans, and resin acids as specific tracers of plant classes in emissions from biomass combustion *Environ. Sci. Technol.* 27:2523-2541.
- Standley, L. J., Kaplan, L. A., Smith, D. In press. Molecular tracers of organic matter sources to surface water resources. *Environ. Sci. Technol.*

Valls, M., Bayona, J. M., Algaigés, J. 1989. Use of trialkylamines as an indicator of urban sewage in sludges, coastal waters and sediments. *Nature* 337:722-724.

J. Threshold Requirements (attached)

UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved 0524-0011
Expires 7/31

CURRENT AND PENDING SUPPORT

Instructions:

- Record information for active and pending projects. (Concurrent submission of a proposal to other organizations will not prejudice its review by CSREES)
- All current research to which principal investigator(s) and other senior personnel have committed a portion of their time must be listed, whether or not salary for the person involved is included in the budgets of the various projects.
- Provide analogous information for all proposed research which is being considered by, or which will be submitted in the near future to, other possible sponsors including other USDA programs.

NAME (List PI#1 first)	SUPPORTING AGENCY AND AGENCY NUMBER	TOTAL \$ AMOUNT	EFFECTIVE AND EXPIRATION DATES	% OF TIME COMMITTED	TITLE OF PROJECT
Laurel J. Standley	Current NSF LTREB	\$250,000	1/98-12/02	0%	LTREB Stream Ecosys. Struct. & Function within a Maturing Deciduous Forest
	EPA	\$220,000	6/00-5/02	12%	Molecular Tracers of Contam. Sources to Surface Water Drinking Supplies
	NY DEC/U.S. EPA	\$401,000	4/00-9/00	18%	Water Quality Monitor. in the Source Water Areas for NYC: An Integrated Watershed Approach
Laurel J. Standley	Pending EPA Region III	\$11,132	2000	3.2%	Using Molecular Tracers to Identify Sources of Contam. to Groundwater
	NSF	\$299,729	7/00-6/03	2/8/1% (Yr 1/2/3)	Acqui. of Liq. Chrom. & Gas Chrom. Mass Spec. for Research on Stream & River Biogeochem.
	Research Inst. for Fragrance Material	\$60,000	6/00-5/02	6%	Fate of Fragrances in Soils
	Cal Fed	\$874,640	1/01-12/03	25%	Assess. the Relative Contrib. of Nutrient Sources to the Sal Joaquin River using Molecular Tracers

UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved 0524-01
Expires 7/31

CURRENT AND PENDING SUPPORT

Instructions:

- Record information for active and pending projects. (Concurrent submission of a proposal to other organizations will not prejudice its review by CSREES)
- All current research to which principal investigator(s) and other senior personnel have committed a portion of their time must be listed, whether or not salary for the person involved is included in the budgets of the various projects.
- Provide analogous information for all proposed research which is being considered by, or which will be submitted in the near future to, other possible sponsors including other USDA programs.

NAME (List PI#1 first)	SUPPORTING AGENCY AND AGENCY NUMBER	TOTAL \$ AMOUNT	EFFECTIVE AND EXPIRATION DATES	% OF TIME COMMITTED	TITLE OF PROJECT
J. Oenis Newbold	Current:				
	NSF LTREB	\$250,000	1/98-12/02	1%	LTREB Stream Ecosys. Struct. & Function within a Maturing Deciduous Forest
	EPA	\$220,000	6/00-5/02	4%	Molecular Tracers of Contam. Sources to Surface Water Drinking Supplies
	NY DEC/US EPA	\$401,000	4/00-9/00	0%	Water Quality Monitor. in the Source Water Areas for NYC: An Integrated Watershed Approach?
	PA DEP	\$347,970	4/97-3/01	10%	Mitigation of Nonpoint Poll. by a Riparian Forest Buffer in an Agricultural Watershed of the Mid-Atlantic Piedmont
J. Oenis Newbold	Pending:				
	Cal Fed	\$874,640	1/01-12/03	5%	Assess. the Relative Contrib. of Nutrient Sources to the Sal Joaquin River using Molecular Tracers
	NSF	1,406,180	7/00-6/03	15%	Dissolved Organic Matter Contrib. to Ecosystem Metabolism Across Stream Orders: Labile Scaling & Hydrodynamics

ASSURANCE STATEMENT(S)

STATEMENT OF POLICY - Safeguarding the rights and welfare of subjects at risk and the proper isolation security of research agents in activities supported by Cooperative State Research, Education, and Extension Service is the responsibility of the institution to which support is provided. In order to provide

for the adequate discharge of this responsibility, USDA policy requires a formal assurance that appropriate committees in each institution will carry out both initial review of proposals and continuing review of supported projects. The Department also requires certification of such reviews.

NOTE: Check appropriate statements, supplying additional information when necessary

<p>1. INSTITUTION</p> <p>Stroud Water Research Center</p>	<p>2. TYPE</p> <p><input checked="" type="checkbox"/> New <input type="checkbox"/> Extension <input type="checkbox"/> Revision</p> <p>3. CSREES PROJECT NUMBER OR AWARD NUMBER (If Known)</p>
<p>4. TITLE OF PROJECT</p> <p>Assessing Sources of Nutrients to the San Joaquin River using Molecular Tracers</p>	<p>5. PRINCIPAL INVESTIGATOR(S)</p> <p>L. J. Standley, Ph.D., P.I. J. D. Newbold, Ph.D., co-P.I.</p>

A. RECOMBINANT DNA OR RNA RESEARCH

☒ Project does not involve recombinant DNA or RNA.

☐ Project involves recombinant DNA or RNA. (Check the applicable statement).

☐ This project has been determined by the local IBC to be exempt from the NIH Guidelines.

☐ This project is under review by the local IBC and a revised Form CSREES-662 will be submitted when the review is completed.

☐ This project has been reviewed by an IBC and was approved on _____ (Date).

This institution agrees to assume primary responsibility for complying with both the intent and procedures of the National Institutes of Health's (NIH) "Guidelines for Research Involving Recombinant DNA Molecules," as revised (see subsection 205(b)(3), Subpart U of the "Uniform Federal Assistance Regulations" (7 CFR Part 3015) and other applicable Federal/State guidelines and regulations.

This responsibility includes:

1. Ensuring that a standing Institutional Biosafety Committee (IBC) reviews proposed projects.
2. Registering with the IBC all experiments involving recombinant DNA and RNA. Molecules conducted with the funds provided under this project/grant and complying with the requirements specified in Part II of the NIH Guidelines or any other pertinent guidelines and regulations. IBC's are required to keep records of this research in a form that is available to the U.S. Department of Agriculture (USDA) upon request.

In addition, principal investigators must report the following to the USDA and to their IBC's:

1. New Technical information relating to risks and safety procedures.
2. Serious accidents or releases involving recombinant DNA or RNA.
3. Serious illness of a laboratory worker which may be project related.
4. Other safety problems.

B. ANIMAL CARE

☒ Project does not involve use of vertebrate animals.

☐ Project involves use of vertebrate animals. (Check the applicable statement).

☐ a) The project is in compliance with the Animal Welfare Act of 1966 and 9 CFR Subchapter A (Laboratory Animals), as amended.

☐ b) This project is under review by the Institutional Care and Use Committee and a revised Form CSREES-662 will be submitted when the review is completed.

☐ c) This project has been approved by the Institutional Animal Care and Use Committee on _____ (Date).

C. PROTECTION OF HUMAN SUBJECTS


☒ Project does not involve use of human subjects.

☐ Project involves use of human subjects. (Check the applicable statement).

☐ a) This project includes activities involving human subjects but can in no way be considered at risk. (If this statement is checked, the person signing this form must also initial in the space at right.) _____ (Initial)

☐ b) This project is under review by an institutional committee as provided by our assurance and a revised Form CSREES-662 will be submitted when the review is completed.

☐ c) This project includes activities involving human subjects. Our institutional committee reviewed and approved it on _____ in accordance with our assurance approved by S&E and/or DHHS. The project will be subject to continuing review as provided for in that assurance.

<p>SIGNATURE OF AUTHORIZED ORGANIZATIONAL REPRESENTATIVE</p> 	<p>TITLE</p> <p>President, Director, Senior Research Scientist</p>	<p>DATE</p> <p>5/12/00</p>
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U.S. DEPARTMENT OF AGRICULTURE

Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017, Section 3017.510. Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989 Federal Register (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency offering the proposed covered transaction.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS)

- (1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
 - (a) are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - (b) have not within a three-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - (d) have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Stroud Water Research Center Assessing Sources of Nutrients to the San Joaquin
Organization Name River using Molecular PR/Award Number or Project Name
Tracers

Bernard W. Sweeney, President, Director, Senior Research Scientist
Name(s) and Title(s) of Authorized Representative(s)


Signature(s)

May 12, 2000

Date

U.S. DEPARTMENT OF AGRICULTURE

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR part 3017. Section 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, Federal Register (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS)

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

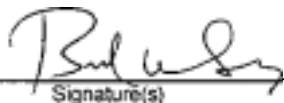
Stroud Water Research Center

Organization Name

Assessing Sources of Nutrients to the San Joaquin
River using Molecular PR/Award Number or Project Name
Tracers

Bernard W. Sweeney, President, Director, Senior Research Scientist

Name(s) and Title(s) of Authorized Representative(s)


Signature(s)

May 12, 2000

Date

UNITED STATES DEPARTMENT OF AGRICULTURE

CERTIFICATION REGARDING DRUG-FREE WORKPLACE REQUIREMENTS (GRANTS) ALTERNATIVE I - FOR GRANTEEES OTHER THAN INDIVIDUALS

This certification is required by the regulations implementing Sections 5151-5160 of the Drug-Free Workplace Act of 1988 (Pub. L. 100-690, Title V, Subtitle D; 41 U.S.C. 701 *et seq.*). 7 CFR Part 3017. Subpart F, Section 3017.600. Purpose. The January 31, 1989, regulations were

amended and published as Part II of the May 25, 1990 Federal Register (pages 21681-21691). Copies of the regulations may be obtained by contacting the Department of Agriculture agency offering the grant.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS)

Alternative I

A. The grantee certifies that it will or will continue to provide a drug-free workplace by:

- (a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (b) Establishing an ongoing drug-free awareness program to inform employees about --
 - (1) The dangers of drug abuse in the workplace;
 - (2) The grantee's policy of maintaining a drug-free workplace;
 - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
- (c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);
- (d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will --
 - (1) Abide by the terms of the statement; and
 - (2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
- (e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(9) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted --

(1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e) and (f).

B. The grantee may insert in the space provided below the site(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, State, zip code)

Stroud Water Research Center

970 Spencer Road

Avondale, Chester, PA 19311

Check [] if there are workplaces on file that are not identified here.

Stroud Water Research Center
Organization Name

Assessing Sources of Nutrients to the San Joaquin
River using
Molecular Tracers
Award Number or Project Name

Bernard W. Sweeney, President, Director, Senior Research Scientist
Name and Title of Authorized Representative


Signature

May 12, 2000
Date

**UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE**

**NOTICE TO APPLICANTS - CERTIFICATION/DISCLOSURE REQUIREMENTS
RELATED TO LOBBYING**

Section 319 of Public Law 101-121 (31 U.S.C.), signed into law on October 23, 1989, imposes new prohibitions and requirements for disclosure and certification related to lobbying on recipients of Federal contracts, grants, cooperative agreements, and loans. Certain provisions of the law also apply to Federal commitments for loan guarantees and insurance; however, it provides exemptions for Indian tribes and tribal organizations.

Effective December 23, 1989, current and prospective recipients (and their subtier contractors and/or subgrantees) will be prohibited from using Federal funds, other than profits from a Federal contract, for lobbying Congress or any Federal agency in connection with the award of a particular contract, grant, cooperative agreement or loan. In addition, for each award action in excess of \$100,000 (or \$150,000 for loans) on or after December 23, 1989, the law requires recipients and their subtier contractors and/or subgrantees to: (1) certify that they have neither used nor will use any appropriated funds for payment to lobbyists; (2) disclose the name, address, payment details, and purpose of any agreements with lobbyists whom recipients or their subtier contractors or subgrantees will pay with profits or nonappropriated funds on or after December 23, 1989; and (3) file quarterly updates about the use of lobbyists if materials changes occur in their use. The law establishes civil penalties for noncompliance.

If you are a current recipient of funding or have an application, proposal, or bid pending as of December 23, 1989, the law will have the following immediate consequences for you:

! You are prohibited from using appropriated funds (other than profits from Federal contracts) on or after December 23, 1989, for lobbying Congress or any Federal agency in connection with a particular contract, grant, cooperative agreement, or loan;

! you are required to execute the attached certification at the time of submission of an application or before any action in excess of \$100,000 is awarded; and

! you will be required to complete the lobbying disclosure form if the disclosure requirements apply to you.

Regulations implementing Section 319 of Public Law 101-121 have been published as an Interim Final Rule by the Office of Management and Budget as Part III of the February 26, 1990, Federal Register (pages 6736-6746).

National Environmental Policy Act Exclusions Form

Principal Investigator/Project Director Name	Institution
Laurel J. Standley	Stroud Water Research Center
Address	
970 Spencer Road, Avondale, PA 19311	

Under 7 CFR Part 3407 (CSREES's implementing regulations of the National Environmental Policy Act of 1969 (NEPA), environmental data or documentation is required in order to assist CSREES in carrying out its responsibilities under NEPA, which includes determining whether proposed research requires the preparation of an environmental assessment or an environmental impact statement, or whether such research can be excluded from this requirement on the basis of several categories. Therefore, it is necessary for the applicant to advise CSREES whether the proposed research falls into one of the following Department of Agriculture or CSREES categorical exclusions, or whether the research does not fall into one of these exclusions (in which case the preparation of an environmental assessment or an environmental impact statement may be required). Even though the applicant considers that a proposed project may or may not fall within a categorical exclusion, CSREES may determine that an environmental assessment or an environmental impact statement is necessary for a proposed project should substantial controversy on environmental grounds exist or if other extraordinary conditions or circumstances are present that may cause such activity to have significant environmental effect.

Please Read All of the Following and Check All Which Apply

☐ The proposed research falls under the categorical **exclusion(s)** indicated below:

Department of Agriculture Categorical Exclusions
(found at 7 CFR 1b.3 and restated at 7CFR 3407.6 (a)(1)(i) through (vii))

- ☐ (i) Policy development, planning and implementation which are related to routine activities such as personnel, organizational changes, or similar administrative functions
- ☒ (ii) Activities that deal solely with the functions of programs, such as program budget proposals, disbursements, and transfer or reprogramming of funds
- ☐ (iii) Inventories, research activities, and studies such as resource inventories and routine data collection when such actions are clearly limited in context and intensity
- ☐ (iv) Educational and informational programs and activities
- ☐ (v) Civil and criminal law enforcement and investigative activities
- ☐ (vi) Activities that are advisory and consultative to other agencies and public and private entities, such as legal counseling and representation
- ☐ (vii) Activities related to trade representation and market development activities abroad

CSREES Categorical Exclusions
(found at 7 CFR 3407.6(a)(2)(i) through (ii))

The following categories of CSREES actions are excluded because they have been found to have limited scope and intensity and to have no significant individual or cumulative impacts on the quality of the human environment:

- (i) The following categories of research program or projects of limited size and magnitude or with only short-term effects on the environment:
 - ☐ (A) Research conducted within any laboratory, greenhouse, or other contained facility where research practices and safeguards prevent environmental impacts
 - ☐ (B) Surveys, inventories, and similar studies that have limited context and minimum intensity in terms of changes in the environment
 - ☐ (C) Testing outside of the laboratory, such as in small isolated field plots, which involve the routine use of familiar chemicals and biological materials
- ☐ (ii) Routine renovation, rehabilitation, revitalization of physical facilities, including the acquisition and installation of equipment, where such activity is limited in scope and intensity

OR

☐ Proposed research does **not** fall into one of the above categorical exclusions

(NOTE: If checked, please attach an explanation of the potential environmental impacts of the proposed research)

May require completion of an environmental assessment or an environmental impact statement.)

NONDISCRIMINATION COMPLIANCE STATEMENT

STD 19 (REV. 3-95)

COMPANY NAME

Stroud Water Research Center

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990(a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME

Bernard W. Sweeney

DATE EXECUTED

May 12, 2000

EXECUTED IN THE COUNTY OF

Chester

PROSPECTIVE CONTRACTOR'S SIGNATURE



PROSPECTIVE CONTRACTOR'S TITLE

President, Director, Senior Research Scientist

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Stroud Water Research Center

All applicants must fill out this Environmental Compliance Checklist. Applications must contain answers to the following questions to be responsive and to be considered for funding. Failure to answer these questions and include them with the application will result in the application being considered nonresponsive and not considered for funding.

- YES X
NO

- Lead Agency

- We will not be spiking any toxic materials to environmental compartments. We are just collecting environmental samples for analysis.

5. Will the applicant require access across public or private property that the applicant does not own *to* accomplish the activities in the proposal?

YES	X
NO	NO

If **yes**, the applicant must attach written permission for access from the relevant properly owner(s). Failure to include written permission for access may result in disqualification of the proposal during the review process. Research and monitoring field projects for which specific field locations have not been identified will be required to provide access needs and permission for access with **30** days of notification of approval.

6. Please indicate what permits or other approvals may be required for the activities contained in your proposal. Check all boxes that apply.

LOCAL

Conditional use permit	<input type="checkbox"/>	
Variance	<input type="checkbox"/>	
Subdivision Map Act approval	<input type="checkbox"/>	
Grading permit	<input type="checkbox"/>	
General plan amendment	<input type="checkbox"/>	
Specific plan approval	<input type="checkbox"/>	
Rezone	<input type="checkbox"/>	<input type="checkbox"/>
Williamson Act Contract		
cancellation	<input type="checkbox"/>	
Other _____		
(please specify)		
None required	<input checked="" type="checkbox"/>	

STATE

CESA Compliance	<input type="checkbox"/>	(CDFG)
Streambed alteration permit	<input type="checkbox"/>	(CDFG)
CWA § 401 certification	<input type="checkbox"/>	(RWQCB)
Coastal development permit	<input type="checkbox"/>	(Coastal Commission/BCDC)
Reclamation Board approval	<input type="checkbox"/>	
Notification	<input type="checkbox"/>	(DPC, BCDC)
Other _____		
(please specify)		
None required	<input checked="" type="checkbox"/>	

FEDERAL

ESA Consultation	<input type="checkbox"/>	(USFWS)
Rivers & Harbors Act permit	<input type="checkbox"/>	(ACOE)
CWA § 404 permit	<input type="checkbox"/>	(ACOE)
Other _____		
(please specify)		
None required	<input checked="" type="checkbox"/>	

DPC = Delta Protection Commission
 CWA = Clean Water Act
 CESA = California Endangered Species Act
 USFWS = U.S. Fish and Wildlife Service
 ACOE = U.S. Army Corps of Engineers

ESA = Endangered Species Act
 CDFG = California Department of Fish and Game
 RWQCB = Regional Water Quality Control Board
 BCDC = Bay Conservation and Development Comm.

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (REV. 3-95)

COMPANY NAME

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CERTIFICATION

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Stroud Water Research Center

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- YES _____ NO _____

- Lead Agency

- We will not be spiking any toxic materials to environmental compartments. We are just collecting environmental samples for analysis.

- | | |
|-----|----|
| YES | NO |
|-----|----|

If yes, the applicant must attach written permission for access from the relevant property owner(s). Failure to include written permission for access may result in disqualification of the proposal during the review process. Research and monitoring field projects for which specific field locations have not been identified will be required to provide access needs and permission for access with 30 days of notification of approval.

6. Please indicate what **permits** or other approvals may be required for the activities contained in your proposal. Check all **boxes** that apply.

LOCAL

Conditional use permit ☐

Variance ☐

Subdivision **Map Act approval** ☐

Grading permit ☐

General plan amendment ☐

Specific plan approval ☐

Rezone

Williamson Act Contract ☐

cancellation ☐

Other ☐

@lease specify) ☐

None required ☒

STATE

CESA Compliance ☐

(CDFG)

Streambed alteration permit ☐

(CDFG)

CWA § 401 certification ☐

(RWQCB)

Coastal development permit ☐

(Coastal Commission/BCDC)

Reclamation Board approval ☐

Notification ☐

(DPC, BCDC)

Other ☐

@lease specify) ☐

None required ☒

FEDERAL

ESA Consultation ☐

(USFWS)

Rivers & Harbors Act permit ☐

(ACOE)

CWA § 404 permit ☐

(ACOE)

Other ☐

@leasespecify) ☐

None required ☒

DPC = Delta Protection Commission

CWA = Clean Water Act

CESA = California Endangered Species Act

USFWS = U.S. Fish and Wildlife Service

ACOE = U.S. Army Corps of Engineers

ESA = Endangered Species Act

CDFG = California Department of Fish and Game

RWQCB = Regional Water Quality Control Board

BCDC = Bay Conservation and Development Comm

All applicants must fill out this Land Use Checklist for their proposal. Applications must contain answers to the following questions to be responsive and to be considered for funding. *Failure to answer these questions and include them with the application will result in the application being considered nonresponsive and not considered for funding.*

- | | |
|-----|---------|
| YES | X
NO |
|-----|---------|

- YES _____ NO _____

- | | |
|----------------------------------|--|
| Current land use | |
| Current zoning | |
| Current general plan designation | |

- YES NO DON'T KNOW

7. If YES to # 1, how many acres of land will be **subject** to physical change or land use restrictions under the proposal?

- YES NO

9. If YES to #8, what are the number of employees/acre _____
the total number of employees _____

10. Will the applicant acquire any interest in land under the proposal (fee title **or** a conservation easement)?

YES

NO

11. What entity/organization will hold the interest? _____

12. If YES to # **10**, answer the following:

Total number of acres to be acquired under proposal

Number of acres to be acquired in fee

Number of acres to be subject to conservation easement

13. **For** all proposals involving physical changes to the land **or** restriction in land **use**, describe what entity **or** organization will:

manage the properly

provide operations and maintenance services

conduct monitoring

14. For land acquisitions (fee title or easements), will existing water rights also be acquired?

YES

X
NO

15. **Does** the applicant propose any modifications to the water right **or** change in the delivery of the water?

YES

NO

16. If YES to # 15, describe_____

**STANDARD CLAUSES -
SERVICE & CONSULTANT SERVICE CONTRACTS FOR \$5,000 & OVER WITH NONPUBLIC ENTITIES**

Workers' Compensation Clause. Contractor affirms that it is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and Contractor affirms that it will comply with such provisions before commencing the performance of the work under this contract.

National Labor Relations Board Clause. In accordance with Public Contract Code Section 10296, Contractor declares under penalty of perjury that no more than one final, unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two-year period because of Contractor's failure to comply with an order of a federal court which orders Contractor to comply with an order of the National Labor Relations Board.

Nondiscrimination Clause. During the performance of this contract, the recipient, Contractor and its subcontractors shall not deny the contract's benefits to any person on the basis of religion, color, ethnic group identification, sex, age, physical or mental disability, nor shall they discriminate unlawfully against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, mental disability, medical condition, marital status, age (over 40), or sex. Contractor shall insure that the evaluation and treatment of employees and applicants for employment are free of such discrimination. Contractor shall comply with the provisions of the Fair Employment and Housing Act (Government Code Section 12900 et seq.), the regulations promulgated thereunder (California Administrative Code, Title 2, Sections 7285.0 et seq.), the provisions of Article 9.5, Chapter 1, Part 1, Division 3, Title 2 of the Government Code (Government Code Sections 11135 - 11139.5), and the regulations or standards adopted by the awarding State agency to implement such article. Contractor or recipient shall permit access by representatives of the Department of Fair Employment and Housing and the awarding State agency upon reasonable notice at any time during the normal business hours, but in no case less than 24 hours' notice, to such of its books, records, accounts, other sources of information and its facilities as said Department or Agency shall require to ascertain compliance with this clause. Recipient, Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement. The Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

Statement of Compliance. The Contractor's signature affixed hereon and dated shall constitute a certification under penalty of perjury under the laws of the State of California that the Contractor has, unless exempted, complied with the nondiscrimination program requirements of Government Code Section 12990 and Title 2, California Code of Regulations, Section 8103.

Performance Evaluation. For consulting service agreements, Contractor's performance under this contract will be evaluated after completion. A negative evaluation will be filed with the Department of General Services.

Availability of Funds. Work to be performed under this contract is subject to availability of funds through the State's normal budget process.

Audit Clause. For contracts in excess of \$10,000, the contracting parties shall be subject to the examination and audit of the State Auditor for a period of three years after final payment under the contract. (Government Code Section 8546.7).

Payment Retention Clause. Ten percent of any progress payments that may be provided for under this contract shall be withheld per Public Contract Code Sections 10346 and 10379 pending satisfactory completion of all services under the contract.

Reimbursement Clause. If applicable, travel and per diem expenses to be reimbursed under this contract shall be at the same rates the State provides for unrepresented employees in accordance with the provisions of Title 2, Chapter 3, of the California Code of Regulations. Contractor's designated headquarters for the purpose of computing such expenses shall be: _____

(Disabled Veteran Business Enterprise Participation Requirement Audit Clause. Contractor or vendor agrees that the awarding department or its delegates will have the right to review, obtain, and copy all records pertaining to performance of the contract. Contractor or vendor agrees to provide the awarding department or its delegate access to its premises, upon reasonable notice, during normal business hours for the purpose of interviewing employees and inspecting and copying such books, records, accounts, and other material that may be relevant to a matter under investigation for the purpose of determining compliance with Public Contract Code Section 10115 et seq. Contractor or vendor further agrees to maintain such records for a period of three (3) years after final payment under the contract. Title 2 OCR Section 1896.75.

Priority Hiring Considerations. For contracts in excess of \$200,000, the Contractor shall give priority consideration in filling vacancies in positions funded by the contract to qualified recipients of aid under Welfare and Institutions Code Section 11200. (Public Contract Code Section 10353).

Drug-Free Workplace Certification. By signing this contract, the Contractor or grantee hereby certifies under penalty of perjury under the laws of the State of California that the Contractor or grantee will comply with the requirements of the Drug-Free Workplace Act of 1990 (Government Code Section 8350 et seq.) and will provide a drug-free workplace by taking the following actions:

1. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations.
2. Establish a Drug-Free Awareness Program to inform employees about all of the following:
 - (a) The dangers of drug abuse in the workplace,
 - (b) The person's or organization's policy of maintaining a drug-free workplace,
 - (c) Any available counseling, rehabilitation and employee assistance programs, and
 - (d) Penalties that may be imposed upon employees for drug abuse violations.
3. Every employee who works on the proposed contract or grant:
 - (a) Will receive a copy of the company's drug-free policy statement, and
 - (b) Will agree to abide by terms of the company's statement as a condition of employment on the contract or grant.

This contract or grant may be subject to suspension of payments or termination, or both, and the Contractor or grantee may be subject to debarment if the department determines that: (1) the Contractor or grantee has made a false certification, or (2) the Contractor or grantee violates the certification by failing to carry out the requirements noted above.

Antitrust Claims. In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder. See Government Code Section 4552.

If an awarding body or public purchasing body received, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery. See Government Code Section 4553.

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action. See Government Code Section 4554.

Americans With Disabilities Act. By signing this contract, Contractor assures the state that it complies with the Americans With Disabilities Act (ADA) of 1990, (42 U.S.C. 12101 et seq.), which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA.

Corporate Qualifications To Do Business In California. Contractor must be currently qualified to do business in California as defined by the Revenue & Taxation Code, Section 23101 unless exempted. Both domestic and foreign corporations (those incorporated outside of California) must be in good standing in order to be qualified to do business in California.

Former State Employees: a) For the two-year period from the date he or she left State employment, no former State officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements or any part of the decision-making process relevant to the contract while employed in any capacity by any State agency. b) For the twelve-month period from the date he or she left State employment, no former State officer or employee may enter into a contract with any State agency if he or she was employed by that State agency in a policy-making position in the same general subject area as the proposed contract within the twelve-month period prior to his or her leaving State service.

Agreement No.: _____

Exhibit: _____

ADDITIONAL STANDARD CLAUSES

Recycled Materials. Contractor hereby certifies under penalty of perjury that _____ (enter value or "0") percent ~~of~~ the materials, goods and supplies offered or products used in the performance of this Agreement meet or exceed the minimum percentage of recycled material as defined in Sections 12161 and 12200 of the Public Contract Code.

Severability. If any provision of this Agreement is held invalid or unenforceable by any court of final jurisdiction, it is the intent of the parties that all other provisions of this Agreement be construed to remain fully valid, enforceable, and binding on the parties.

Governing Law. This Agreement is governed by and shall be interpreted in accordance with the laws of the State of California.

Y2K Language. The Contractor warrants and represents that the goods or services sold, leased, or licensed to the State of California, its agencies, ~~or~~ its political subdivisions, pursuant to this Agreement are "Year 2000 compliant." For purposes of this Agreement, a good or service is Year 2000 compliant if it will continue to fully function before, at, and after the Year 2000 **without** interruption and, if applicable, with full ability to accurately and unambiguously process, display, compare, calculate, manipulate, and otherwise utilize date information. This warranty and representation supersedes all warranty disclaimers and limitations and all limitations on liability provided by or through the Contractor.

Child Support Compliance Act For any agreement in excess of \$100,000, the Contractor acknowledges in accordance therewith, that:

1. The Contractor recognizes the importance of child and family support obligations and shall fully comply with all applicable State **and** federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Chapter 8 (commencing with Section 5200) of Part 5 of Division **9** of the Family Code; and
2. The Contractor, to the **best** of its knowledge, is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire **Registry** maintained **by** the California Employment Development Department.

UNITED STATES DEPARTMENT OF AGRICULTURE

CERTIFICATION REGARDING DRUG-FREE WORKPLACE REQUIREMENTS (GRANTS) ALTERNATIVE I - FOR GRANTEE OTHER THAN INDIVIDUALS

INSTRUCTIONS FOR CERTIFICATION AD 1049

1. By signing and submitting this form, the grantee is providing the certification set out on pages 1 and 2
2. The certification set out on pages 1 and 2 is a material representation of fact upon which reliance is placed when the agency awards the grant. If it is later determined that the grantee knowingly rendered a false certification, or otherwise violates the requirements of the Drug-Free Workplace Act, the agency, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.
3. Workplaces under grants, for grantees other than individuals, need not be identified on the certification. If known, they may be identified in the grant application. If the grantee does not identify the workplaces at the time of application, or upon award, if there is no application, the grantee must keep the identity of the workplace(s) on file in its office and make the information available for Federal inspection. Failure to identify all known workplaces constitutes a violation of the grantee's drug-free workplace requirements.
4. Workplace identifications must include the actual address of buildings (or parts of buildings) or other sites where work under the grant takes place. Categorical descriptions may be used (e.g., all vehicles of a mass transit authority or State highway department while in operation, State employees in each local unemployment office, performers in concert halls or radio studios).
5. If the workplace identified to the agency changes during the performance of the grant, the grantee shall inform the agency of the change(s), if it previously identified the workplaces in question (see paragraph three).
6. Definitions of terms in the Nonprocurement Suspension and Debarment common rule and Drug-Free Workplace common rule apply to this certification. Grantees' attention is called, in particular, to the following definitions from these rules:

"Controlled" substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, use, or possession of any controlled substance;

"Employee" means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all "direct charge" employees; (ii) all "indirect charge" employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantee's payroll; or employees of subrecipients or subcontractors in covered workplaces).